APPENDIX C: PROBE & DIPOLE CALIBRATION DATA



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

Page **2(79)**

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Probe 1643

Calibration Laboratory of Schmid & Partner Engineering AG Zeu Shausstrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
Swiss Calibration Sorvice

Accreditation No.: SCS 0108

Acordited by the Swiss Accreditation Service (SAS)

The swiss Accreditation Service is one of the signatories to the EA Mulfflateral Agreement for the recognition of calibration certificates

CHER

Blackberry Waterloo

Calibration Equipment used (M&TE critical for calibration)

Certificate No: ET3-1643 Mar15

CALIBRATION CERTIFICATE

Object ET3DV6 - SN:1643

Calibration procedure(s) QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: March 13, 2015

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Primary Standards	ID =	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-D1911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013, Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-860 Jan15)	Jan-16
Secondary Standards	10	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check; Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Name Function Signature
Calibrated by: Israe Elnacuri Laboratory Technician

Approved by: Katja Pokovic Tachnical Manager

Issued: March 13, 2015

This calibration certificate shall not be reproduced except in full willbout written approval of the laboratory.

Certificate No: ET3-1643_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data

Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No

RTS-6067-1505-05

FCC ID: L6ARHR190LW

2503A-RHR190LW

Callbration Laboratory of Schnid & Partner Eligineering AG Zeu9hausstrasse 43, 3004 Zurich, Switzerland





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C Service suisse d'étalonnage
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Swiss Calibration Service

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Glossary:

TSL NORMX,y,z Conve DCP tissue simulating liquid sensitivity in free space sensitivity in TSL / NORMx,y.z diode compression point

CF crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters

Polarization ip oprotation around probe axis

Potatization 8 9 rotation around an axis that is in the plane normal to probe axis (at measurement center),

i.e., 8 = 0 is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques: June 2013
- Techniques", June 2013
 b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 8 = 0 (f < 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide)
 NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E²-field
 uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z * frequency_response (see Frequency Response Charl). This linearization is
 implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
 in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- Ax.y,z; Bx.y,z; Cx,y,z; Dx,y,z; VRx,y,z; A, B, C, D are numerical linearization parameters assessed based on the data of power-sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f s 800 MHz) and inside waveguide using analytical fleid distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (eighs, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z * CanvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): In a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip
 (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No. ET3-1643_Mar15

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Probe ET3DV6

SN:1643

Manufactured: Calibrated: November 7, 2001 March 13, 2015

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ET3-1643_Mar15

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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

ETૐD/6~ SN:1643

March 13, 2015

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1643

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
NQ ^(m) (μV/(V/m) ²) ^A	1.76	1.95	1.75	± 10.1 %
DCP (mV)B	101.5	100.5	102.4	

Madulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc ^c (k=2)
0	CW	X	0.0	0.0	1.0	0.00	261.1	±3.8 %
		Y	0.0	0.0	1.0		237.4	
		Z	0.0	0.0	1.0		267.0	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: ET3-1643_Mar15

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^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^a Numerical linearization parameter: uncertainty not required.

^a Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field Value.



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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

ET/30V6- SN:1643

March 13, 2015

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1643

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	6.69	6.69	6.69	0.32	3.00	± 12.0 %
900	41.5	0.97	6.09	6.09	6.09	0.33	3.00	± 12.0 %
1810	40.0	1.40	5.18	5.18	5.18	0.80	2.02	± 12.0 %
1950	40.0	1.40	4.93	4.93	4.93	0.80	2.06	± 12.0 %
2450	39.2	1.80	4.58	4.58	4.58	0.80	1.62	± 12.0 %

⁶ Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

**Af frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

**AlphafDepth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: ET3-1643_Mar15



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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

ET 20V6- SN:1643

March 13, 2015

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1643

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	6.29	6.29	6.29	0.36	2.49	± 12.0 %
900	55.0	1.05	6.00	6.00	6.00	0.33	3.00	± 12.0 %
1810	53.3	1.52	4.50	4.50	4.50	0.80	2.60	± 12.0 %
1950	53.3	1.52	4.56	4.56	4.56	0.80	2.23	± 12.0 %
2450	52.7	1.95	3.93	3.93	3.93	0.70	1.60	± 12.0 %

⁶ Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency

Certificate No: ET3-1643_Mar15

validity can be extended to ± 110 MHz.

F At frequencies below 3 GHz, the validity of tissue parameters (s and o) can be relaxed to ± 10% if liquid compensation formula is applied to

At requestions below 3 GHz, the values of inside parameters (s and σ) can be relaxed to ± 10% in liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (c and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Apha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



Appendix C for the BlackBerry® Smartphone Model RHR191LW

(SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: **L6ARHR190LW**

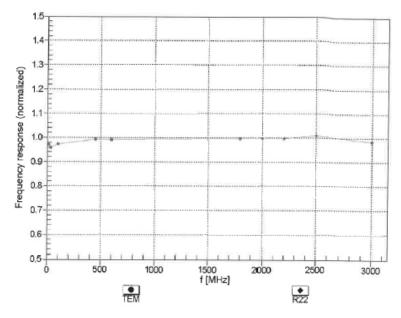
2503A-RHR190LW

ET'30V6- SN:1643

March 13, 2015

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test
Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

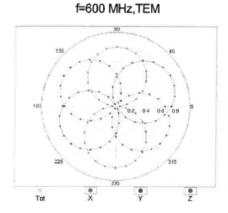
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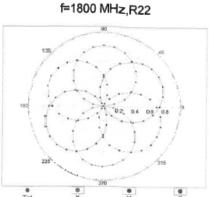
2503A-RHR190LW

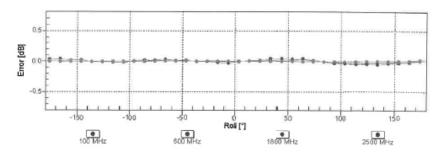
ET/30V6- SN:1643

March 13, 2015

Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$







Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

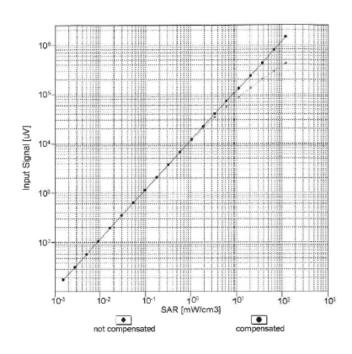
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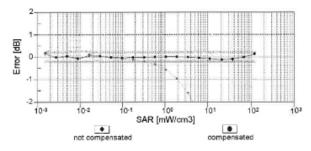
2503A-RHR190LW

ET/30/6~ SN:1643

March 13, 2015

Dynamic Range f(SAR_{head}) (TEM cell , f_{eval}= 1900 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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Appendix C for the BlackBerry® Smartphone Model RHR191LW

(SQW100-4) SAR Report

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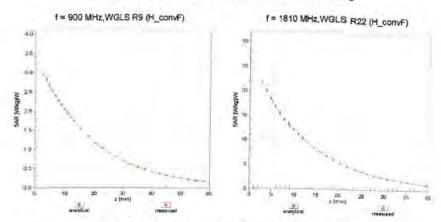
Author Data **Andrew Becker** Dates of Test Mar 30 - May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

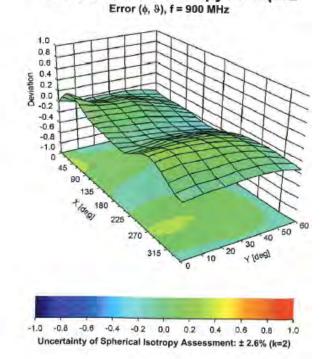


March 13, 2015

Conversion Factor Assessment



Deviation from Isotropy in Liquid



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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

ET 30V6- SN:1643

March 13, 2015

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1643

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	3.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

Certificate No: ET3-1643_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mor 30 Mos

Mar 30 - May 14, 2015

Test Report No

RTS-6067-1505-05

FCC ID: L6ARHR190LW

2503A-RHR190LW

Probe 3225

Ca libration Laboratory of Sc h™id & Partner En§ineering AG Zeu Shastrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst Service suisse d'étalonnage

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Accreditation No.: SCS 0108

Accor edited by the Swiss Accreditation Service (SAS)

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Client

Blackberry Waterloo

Certificate No: ES3-3225_Feb15

CALIBRATION CERTIFICATE

Object

ES3DV3 - SN:3225

Cati bration procedure(s)

QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes

Cali bration date:

February 25, 2015

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).

The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility; environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
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Reference 20 dB Attenuator	SN: S5277 (20x)	83-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	83-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Celibrated by:

Claudio Leubler

Laboratory Technician

Approved by:

Katja Pokowo

Fechnical Manager

Issued: February 25, 2015

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Certificate No: ES3-3225_Feb15

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Author Data

Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No

RTS-6067-1505-05

FCC ID: L6ARHR190LW

2503A-RHR190LW

Ca litration Laboratory of Schhid & Partner Figineering AG Zeu Shusstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst Service suisse d'étalonnage C Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 0108

Acc Feited by the Swiss Accreditation Service (SAS)

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GI₽%sary:

NO Rlix,y,z

tissue simulating liquid sensitivity in free space sensitivity in TSL / NORMx,y,z diode compression point

DC P CE Ã, B, C, D

crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters

Polarization o

φ rotation around probe axis

Polarization 8

9 rotation around an axis that is in the plane normal to probe axis (at measurement center),

i.e., 9 = 0 is normal to probe axis

Cornector Angle

information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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- NORM(f)x,y,z = NORMx,y,z * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z; A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No: ES3-3225_Feb15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW

(SQW100-4) SAR Report

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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

Probe ES3DV3

SN:3225

Manufactured: Repaired:

September 1, 2009 February 18, 2015

Calibrated:

February 25, 2015

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ES3-3225_Feb15

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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

ES/3D/3-SN:3225

February 25, 2015

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3225

B# Sc Calibration Parameters

- Combination Fare	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
NQ ^{(h} (μV/(V/m) ²) ^A	1.07	1.00	1.12	± 10.1 %
DCP (mV) ^B	107.0	106.0	105.6	

Modulation Calibration Parameters

UÍ D	Communication System Name		A dB	B dB√μV	С	dB	VR mV	Unc [±] (k=2)
0	ÇW	X	0.0	0.0	1.0	0.00	196.9	±3.3 %
		Y	0.0	0.0	1.0		189.2	
		Z	0.0	0.0	1.0		195.9	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

<sup>Numerical linearization parameter: uncertainty not required.

Numerical linearization parameter: uncertainty not required.

Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.</sup>



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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

ES \$10/3- SN:3225

February 25, 2015

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3225

Ca litration Parameter Determined in Head Tissue Simulating Media

f(MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha ⁶	Depth ⁶ (mm)	Unct. (k=2)
750	41.9	0.89	6.50	6.50	6.50	0.61	1.31	± 12.0 %
900	41.5	0.97	6.22	6.22	6.22	0.30	1.84	± 12.0 %
1810	40.0	1.40	5.26	5.26	5.26	0.50	1.46	± 12.0 %
1950	40.0	1.40	5.01	5.01	5.01	0.80	1.11	± 12.0 %
2300	39.5	1.67	4.77	4.77	4.77	0.75	1.25	± 12.0 %
2450	39.2	1.80	4.60	4.60	4.60	0.57	1.49	± 12.0 %
2600	39.0	1.96	4.40	4.40	4.40	0.72	1.30	± 12.0 %

^c Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), alse it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

**Af frequencies below 3 GHz, the validity of tissue parameters (c and α) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (c and α) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

**AjphaDepth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: ES3-3225_Feb15

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18(79)

Author Data Andrew Becker Dates of Test

Mar 30 – May 14, 2015

Test Report No RTS-6067-1505-05 FCC ID:

L6ARHR190LW

2503A-RHR190LW

ES 2013-SN:3225

February 25, 2015

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3225

Ca Ilkration Parameter Determined in Body Tissue Simulating Media

fMHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	6.19	6.19	6.19	0.80	1.23	± 12.0 %
_900	55.0	1.05	6.07	6.07	6.07	0.53	1.41	± 12.0 %
1810	53.3	1.52	4.89	4.89	4.89	0.63	1.46	± 12.0 %
1950	53.3	1.52	4.86	4.86	4.86	0.44	1.86	± 12.0 %
2300	52.9	1.81	4.48	4.48	4.48	0.80	1.29	± 12.0 %
2450	52.7	1.95	4.34	4.34	4.34	0.72	1.14	± 12.0 %
2600	52.5	2.16	4.06	4.06	4.06	0.80	1.08	± 12.0 %

^c Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the CorvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 310 MHz is ± 10, 25, 40, 50 and 70 MHz for CorvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency

Certificate No: ES3-3225_Feb15

below 3to AHz is ± 10, 25, 40, 50 and 70 MHz for Convir assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz requency valid fit year be extended to ± 110 MHz.

Fat frequencies below 3 GHz, the validity of tissue parameters (c and d) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (c and d) is restricted to ± 5%. The uncertainty is the RSS of the Convir uncertainty in indicated target tissue parameters.

AlphaDepth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is

aways less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: **L6ARHR190LW**

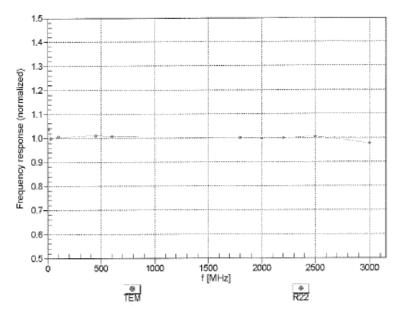
2503A-RHR190LW

ESૐ^{D\}3~ SN:3225

February 25, 2015

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Certificate No: ES3-3225_Feb15

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

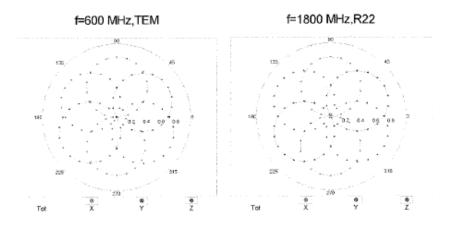
FCC ID: **L6ARHR190LW**

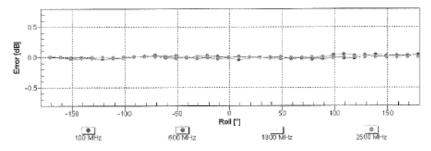
2503A-RHR190LW

ES# D/3- SN:3225

February 25, 2015

Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$





Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Certificate No: ES3-3225_Feb15

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∷ BlackBerry

Appendix C for the BlackBerry \otimes Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

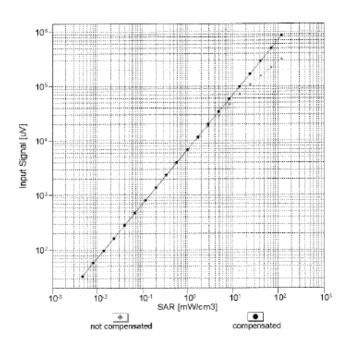
Mar 30 – May 14, 2015

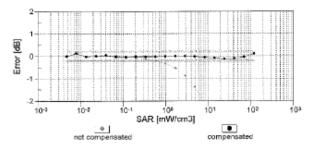
Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

(TEM cell , f_{eval}= 1900 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ES3-3225_Feb15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

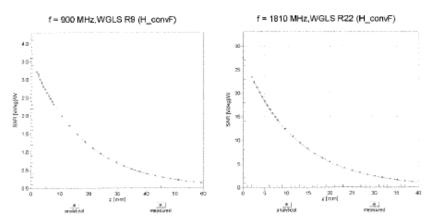
FCC ID: L6ARHR190LW

2503A-RHR190LW

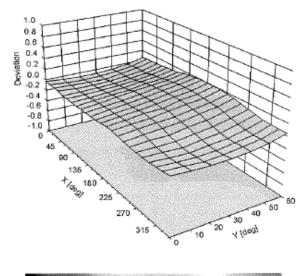
ES \$ D/3 - SN:3225

February 25, 2015

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ø, 9), f = 900 MHz



-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0 Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: ES3-3225_Feb15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

ES∮^{D/}3- SN:3225

February 25, 2015

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3225

Other Probe Parameters

Sentor Arrangement	Triangular
Conjector Angle (°)	-61.4
Meclanical Surface Detection Mode	enabled
OPIkal Surface Detection Mode	disabled
Prote Overall Length	337 mm
Prote Body Diameter	10 mm
Tip length	10 mm
Tip Diameter	4 mm
Prote Tip to Sensor X Calibration Point	2 mm
Prote Tip to Sensor Y Calibration Point	2 mm
Prote Tip to Sensor Z Calibration Point	2 mm
Reximmended Measurement Distance from Surface	3 mm

Certificate No: ES3-3225_Feb15

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*: BlackBerry	y	Appendix C for the (SQW100-4) SAR I	BlackBerry® Smartpho Report	ne Model RHR191L	W	Page 24(79)
Author Data	Dates of Te	st	Test Report No	FCC ID:	IC	
Andrew Becker	Mar 3	0 – May 14, 2015	RTS-6067-1505-05	L6ARHR190LW	2503A-R	RHR190LW

Probe 3592



25(79)

Author Data **Andrew Becker** Dates of Test

Mar 30 – May 14, 2015

Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kallbrierdienst Service suisse d'étalonnage C Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108 Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Blackberry Waterloo

Certificate No: EX3-3592_Nov14

CALIBRATION CERTIFICATE

Object

EX3DV4 - SN:3592

Calibration procedure(s)

QA CAL-01,v9, QA CAL-14,v4, QA CAL-23,v5, QA CAL-25,v6

Calibration procedure for dosimetric E-field probes

Calibration date:

November 10, 2014

This calibration certificate documents the tracoability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humitity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID:	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3u)	. 03 Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	(3-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN; S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ESUDV2	5N: 3013	30-Dec-13 (No. ES3-3013, Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-960_Dec13)	Dec-14
Secondary Standards	(0)	Gheck Date (in house)	Schadulad Check
RI- generator HP 8648C	U83642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753F	US37390585	18-Oct-01 (in house check Oct-14)	In house sheck: O4t-15

	Name	Function	Signature
Calibrated by:	Left Klysner	Laboratory Technician	Seef Hy
Approved by:	Katja Pukovic	Technical Manager	Re ag-
			Issued: November 10, 2014

Certificate No. EX3-3592_Nov14

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data

Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No

RTS-6067-1505-05

FCC ID: L6ARHR190LW

2503A-RHR190LW

Calibration Laboratory of

Schmid & Partner
Engineering AG
Zoughausstrasse 43, 8004 Zurich, Switzerland





S Schweizerlscher Kalibrierdiensi
C Service suisse d'étalonnage
Servizio svizzero di taratura
Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL tissue simulating liquid
NORMx,y,z sensitivity in free space
GonvF sensitivity in TSL / NORMx,y,z
DCP diode compression point

CF crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters

Polarization q o rotation around probe axis

Polarization 9 9 rotation around an axis that is in the plane normal to probe axis (at measurement center),

i.e., 8 = 0 is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

 i) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

 b) IEC 62209-1. "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)". February 2005

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide).
 NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z * frequency response (see Frequency Response Chart). This linearization is
 implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
 in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z; A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Perameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for 1 < 800 MHz) and inside waveguide using analytical field distributions based on power measurements for 1 > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z * CornvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): In a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

EX3DV4 - SN:3592

November 10, 2014

Probe EX3DV4

SN:3592

Manufactured: Calibrated:

September 18, 2006 November 10, 2014

Calibrated for DASY/EASY Systems (Note: non-compatible with DASY2 system!)

Certificate No: EX3-3592 Nov14

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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

EX3DV4-SN:3592

November 10, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3592

Basic Calibration Parameters

	Sensor X	SensorY	Sensor Z	Unc (k=2)
Norm (µV/(V/m) ²) ^A	0.48	0.47	0.40	±10.1 %
DCP (mV) ^a	95.2	0.86	98.8	

Modulation Calibration Parameters

מוט	Communication System Name		A dB	B dBõV	C	D dB	VR mV	Unc* (k=2)
0	CW	X	0.0	0.0	1.0	0.00	145.9	±3.3 %
	10.00	Y	0.0	0,0	1.0		156.9	
		Z	0.0	0.0	1.0		149.1	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%

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 $^{^{\}Lambda}$ The uncertainties of NormX,Y.Z do not affect the E $^{\prime}$ field uncertainty inside TSL (see Pages 5 and 6).

¹⁸ Numerical linearization parameter, uncertainty not required.
¹⁹ Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

EX3DV4-SN:3592

November 10, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3592

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
2600	39.0	1.96	6.80	6.80	6.80	0.36	0.93	± 12.0 %
5250	35.9	4.71	4.63	4.63	4.63	0.35	1.80	± 13.1 %
5600	35.5	5.07	4,20	4.20	4.20	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.34	4.34	4:34	0.40	1.80	± 13.1 %

Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (add Page 2), alse it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 84, 128, 190 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

At frequencies below 3 GHz, the validity of tissue parameters (a and or) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (c and or) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

AppliaDepth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies aclow 3 GHz and below ± 2% for frequencies between 3-8 GHz at any distance larger than half the probe to diameter from the boundary.

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diameter from the boundary.



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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

EX3DV4 SN:3592

November 10, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3592

Calibration Parameter Determined in Body Tissue Simulating Media

F(MHz) C	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^C (mm)	Unct. (k=2)
2600	52.5	2.18	6.84	6.84	6,84	0.78	0.62	± 12.0 %
5250	48,9	5.36	4.06	4.06	4.06	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.78	3.78	3.78	0.45	1.90	± 13.1 %
5750	48.3	5.94	3.81	3.81	3.81	0.50	1.90	± 13.1 %

Frequency validity above 306 MHz of ± 103 MHz only applies for DASY V4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

At frequencies below 3 GHz, the validity of tissue parameters (cland of can be released to ± 10% if liquid compansation formula is applied to

Certificate No: EX3-3592_Nov14

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At frequencies below 3 GHz, the validity of tissue parameters (clandic) can be relaxed to ± 10% if liquid compansation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (clandic) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated larger itssue parameters.

Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and heliow ± 2% for frequencies between 3.6 GHz at any distance larger than half the probe tip claimater from the boundary.



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

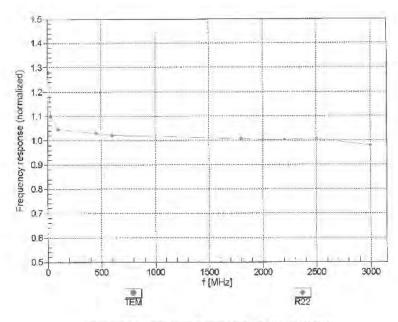
FCC ID: L6ARHR190LW

2503A-RHR190LW

EX3DV4- 5N:3592

November 10, 2014

Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

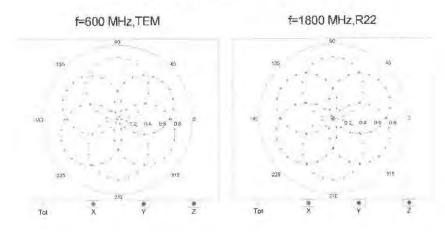
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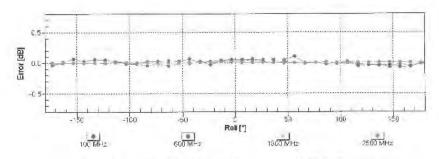
2503A-RHR190LW



November 10, 2014

Receiving Pattern (\$\phi\$), 9 = 0°





Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

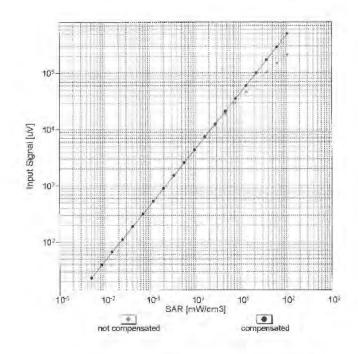
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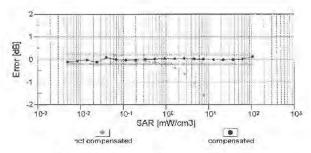
2503A-RHR190LW

EX3DV4 SN:3592

November 10, 2014

Dynamic Range f(SAR_{head}) (TEM cell , f_{eval}= 1900 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: EX3-3592 Nov14

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

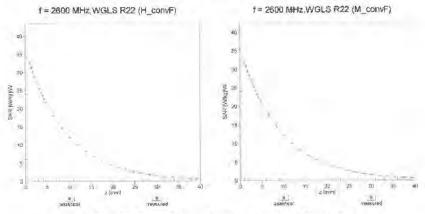
FCC ID: L6ARHR190LW

2503A-RHR190LW

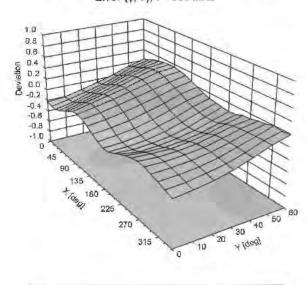
EX3DV4-SN:3592

November 10, 2014

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (\$\phi\$, \$\partial\$), f = 900 MHz



Certificate No: EX3-3592_Nov14

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Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

0.6 0.8

-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

EX3DV4-SN:3592

November 10, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3592

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-13.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	mm f
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1,4 mm

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

750 Dipole

Caliphation Laboratory of Schmit & Partner Engheering AG Zeughattasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kalibrierdiens C Service suisse d'étalonnage Servizio svizzero di teratura S Swiss Calibration Service

Accreditation No.: SCS 0108

Accred the by the Swiss Accreditation Service (SAS)

The Sw^Nis Accreditation Service is one of the signatories to the EA Multile that Agreement for the recognition of calibration certificates

Client Blackberry Waterloo

Certificate No: D750V3-1021_Mar15

Object	D750V3 - SN:10	21	
Calibration procedure(s)	QA CAL-05.v9 Calibration proces	dure for dipole validation kits abo	ove 700 MHz
Calibration date:	March 11, 2015		
		onal standards, which realize the physical un robability are given on the following pages ar	
All calibrations have been condu	cted in the closed laborato	ry facility: environment temperature (22 ± 3)*4	C and humidity < 70%.
Calibration Equipment used (M&)	TE critical for calibration)		
	TE critical for calibration)	Cal Date (Cartificate No.)	Scheiduled Calibration
Primary Standards		Cal Date (Cartificate No.) 07-Oct-14 (No. 217-02020)	Scheduled Calibration Oct-15
Primary Standards Power mater EPM-442A	ID #		The second secon
Primary Standards Power muter EPM-442A Power sensor HP 8481A	ID # GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Primary Standards Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A	ID # GB37480704 US37292783	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020)	Oct-15 Oct-15
Primary Standards Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783 MY41092317	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021)	Oct-15 Oct-15 Oct-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. 237-01921) 30-Dec-14 (No. ES3-3205_Dec)4)	Oct-15 Oct-15 Oct-15 Apr-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20%) SN: 5047.2/06327	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15
Primary Standards Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. 237-01921) 30-Dec-14 (No. ES3-3205_Dec)4)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 US37292783 MY410923(7 SN: 5058 (20k) SN: 5047 2 / 06327 SN: 5047 2 / 06327 SN: 601	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01911) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check
Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06	ID # GB37480704 US37292783 MY41092317 SN: 5058 (2014) SN: 5047 2 / 06327 SN: 3206 SN: 601	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Schedulad Check In house check: Oct-16
Calibration Equipment used (M&I Primary Standards Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. E33-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292783 MY410923(7 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3206 SN: 601 ID # 100005 US37390585 S4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. E53-3205_Dec-14) 18-Aug-14 (No. DAE4-601_Aug-14) Check Date (in house) 04-Aug-98 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Schedulad Check In house check: Oct-16
Primary Standards Power meter EPM-442A Power sensor IIP 8481A Power sensor IIP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06 Network Analyzer IIP 8753E	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. E33-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-15
Primary Standards Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator P&S SMT-06	ID # GB37480704 US37292783 MY410923(7 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3206 SN: 601 ID # 100005 US37390585 S4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. E53-3205_Dec-14) 18-Aug-14 (No. DAE4-601_Aug-14) Check Date (in house) 04-Aug-98 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-15

Certificat e No: D750V3-1021_Mar15

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∷ BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data

Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No

RTS-6067-1505-05

FCC ID: L6ARHR190LW

2503A-RHR190LW

Calib ation Laboratory of

Schn & Partner En@heering AG Zeugha Vistrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst Service suisse d'étalonnage C Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS) The Syvile Accreditation Service is one of the signato Multilate al Agreement for the recognition of calibration certificates

Glos Sary:

TSL ConvF N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL. The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Mea≶ rement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	****	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.28 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.42 W/kg ± 16.5 % (k=2)



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

App@ndix (Additional assessments outside the scope of SCS 0108)

Ante Ina Parameters with Head TSL

Inpedance, transformed to feed point	$55.3 \Omega + 0.3 j\Omega$		
Fleturn Loss	- 25.9 dB		

General Antenna Parameters and Design

~	
Electrical Delay (one direction)	1.032 ns

After IOng term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 01, 2010



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

DAS YS Validation Report for Head TSL

Date: 11.03.2015

Test Liboratory: SPEAG, Zurich, Switzerland

DUT : Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1021

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: f = 750 MHz; $\sigma = 0.9 \text{ S/m}$; $\epsilon_r = 40.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Meas urement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

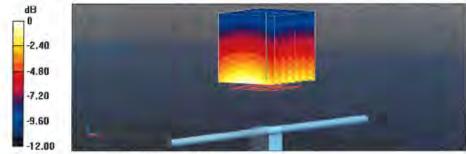
DAS \$52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.44, 6.44, 6.44); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 54.15 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 3.15 W/kg SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg

SAR(1g) = 2.1 W/kg; SAR(10g) = 1.37 W/kgMaximum value of SAR (measured) = 2.45 W/kg



0 dB = 2.45 W/kg = 3.89 dBW/kg

Certificate No: D750V3-1021_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

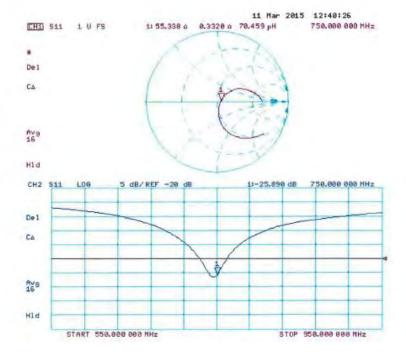
Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Imperiance Measurement Plot for Head TSL



Certificate No: D750V3-1021_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

835 Dipole

Cali Plation Laboratory of Schrind & Partner En Gneering AG Zough Platrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kalibrierdienst
C Service sulsse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accreditation No.: SCS 0108

Accreding by the Swiss Accreditation Service (SAS)

The Swis Accreditation Service is one of the signatories to the EA Multilistical Agreement for the recognition of calibration certificates

Client

Blackberry Waterloo

Certificate No: D835V2-446 Mar15

CALIBRATION CERTIFICATE D835V2 - SN:446 Calibration procedure(s) QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz March 11, 2015 Calibration date: This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI), The measurements and the uncertainties with confidence propability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Cal Date (Certificate No.) Scheduled Calibration Primary Standards G837480704 Oct-15 Power meter EPM-442A 07-Oct-14 (No. 217-02020) US37292783 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A Oct-15 MY41092317 07-Oct-14 (No. 217-02021) Power sensor HP 8481A Apr-15 Reference 20 dB Attenuator SN: 5058 (20k) 03-Apr-14 (No. 217-01918) Type-N mismatch combination SN: 5047.2 / 06327 03-Apr-14 (No. 217-01921) Apr-15 Reference Probe ESSDV3 SN: 3205 30-Dec-14 (No. ES3-3205_Dec14) Dec-15 DAE4 SN: 601 18-Aug-14 (No. DAE4-601_Aug14) Aug-15 Scheduled Check Secondary Standards ID # Check Date (in house) RF generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-13) In house check: Oct-16 US37390585 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-15 Network Analyzer HP 8753E Function Name Michael Weber Laboratory Technician Calibrated by: Technical Manager Approved by: Katja Pokovic issued March 12, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: D835V2-446_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data

Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No

RTS-6067-1505-05

FCC ID: L6ARHR190LW

2503A-RHR190LW

Califration Laboratory of

Schrifid & Partner Engineering AG Zeugh Esstrasse 43, 8004 Zurich, Switzerland





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C Service suisse d'étalonnage
Servizie svizzero di taratura
S Swiss Calibration Service

Accreditation No.: SCS 0108

Accred ad by the Swiss Accreditation Service (SAS)

The S^{4M}as Accreditation Service is one of the signatories to the EA Multil ^{2M}iral Agreement for the recognition of calibration certificates

Glossary:

TSL

tissue simulating liquid

Con¥F N/A

sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end
 of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed
 point exactly below the center marking of the flat phantom section, with the arms oriented
 parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole
 positioned under the liquid filled phantom. The impedance stated is transformed from the
 measurement at the SMA connector to the feed point. The Return Loss ensures low
 reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point.
 No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: D835V2-446_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Mea Surement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.28 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.06 W/kg ± 16.5 % (k=2)

Certificate No: D835V2-446_Mar15



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

App€¹dix (Additional assessments outside the scope of SCS 0108)

Ante na Parameters with Head TSL

Inpedance, transformed to feed point	50.6 Ω - 4.8 jΩ	
Return Loss	- 26.4 dB	

General Antenna Parameters and Design

1.383 ns

After IOng term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 24, 2001

Certificate No: D835V2-446_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

DAS \$5 Validation Report for Head TSL

Date: 11.03.2015

Test I-aboratory: SPEAG, Zurich, Switzerland

DUT : Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:446

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; $\sigma = 0.92$ S/m; $\epsilon_r = 40.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

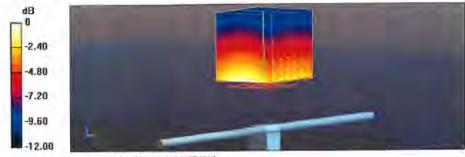
Meas rement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DAS \$52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L, Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 56.83 V/m; Power Drift = 0.02 dB Peak SAR (extrapolated) = 3.55 W/kg SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg Maximum value of SAR (measured) = 2.78 W/kg



0 dB = 2.78 W/kg = 4.44 dBW/kg



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

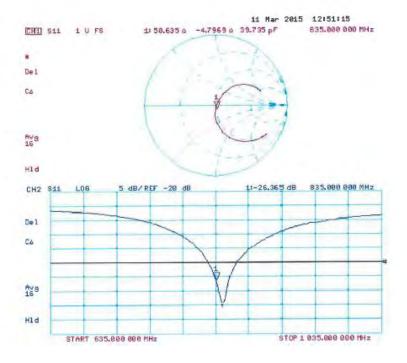
Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: **L6ARHR190LW**

2503A-RHR190LW

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-446_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

1800 Dipole

Cal bistion Laboratory of Sch mit & Partner Engheering AG Zeug austrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kalibrierdienst
C Service sulsse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accreditation No.: SCS 0108

Accred Cities by the Swiss Accreditation Service (SAS)

The Swis Accreditation Service is one of the signatories to the EA Multis Aleas Agreement for the recognition of calibration certificates

lient Bla

Blackberry Waterloo

Certificate No: D1800V2-2d020_Mar15

Obje c 1	D1800V2 - SN:	2d020	
Calibration procedure(s)	QA CAL-05.v9 Calibration proc	edure for dipole validation kits ab	oove 700 MHz
Calibration dates	March 12, 2015		
	cted in the closed laborato	probability are given on the following pages a ry facility: environment temperature $(22 \pm 3)^{\circ}$	
rimary Standards	ID#	Cal Date (Certificate No.)	Schedulad Calibratia
	ID # GB37480704	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020)	Scheduled Calibration
ower meter EPM-442A lower sensor HP 8481A			Scheduled Calibration Oct-15
ower meter EPM-442A ower sensor HP 8481A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A eference 20 dB Attenuator	GB37480704 US37292783	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020)	Oct-15 Oct-15
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A eference 20 dB Attenuator ype-N mismatch combination	GB37480704 US37292783 MY41092317	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021)	Oct-15
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A eference 20 dB Attenuator ype-N mismatch combination eference Probe ES3DV3	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918)	Oct-15 Oct-15 Oct-15 Apr-15
ower meter EPM-442A tower sensor HP 8481A vower sensor HP 8481A leference 20 dB Attenuator ype-N mismatch combination teference Probe ES3DV3	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A eference 20 dB Attenuator ype-N mismatch combination eference Probe ES3DV3 AE4	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 03-Apr-14 (No. 217-01921) 03-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15
Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A deterence 20 dB Attenuator ype-N mismatch combination deterence Probe ES3DV3	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A eference 20 dB Attenuator ype-N mismatch combination eference Probe ES3DV3 AE4 econdary Standards F generator R&S SMT-06	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 03-Apr-14 (No. 217-01921) 03-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Power sensor HP 8481A Reference Probe ES3DV3 Refer	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-15 In house check: Oct-15
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A ower sensor HP 8481A efference 20 dB Attenuator ope-N mismatch combination efference Probe ES3DV3 AE4 econdary Standards F generator R&S SMT-06 etwork Analyzer HP 8753E	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A ower sensor HP 8481A eference 20 dB Attenuator ype-N mismatch combination eference Probe ES3DV3 AE4 econdary Standards F generator R&S SMT-06 etwork Analyzer HP 8753E	GB37480704 US37292783 MY41092317 SN: 5056 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-15 In house check: Oct-15
Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator ype-N mismatch combination Reference Probe ES3DV3 WAE4 Recondary Standards	GB37480704 US37292783 MY41092317 SN: 5056 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-15 In house check: Oct-15
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A eference 20 dB Attenuator ype-N mismatch combination eference Probe ES3DV3 AE4 econdary Standards F generator R&S SMT-06 etwork Analyzer HP 8753E	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206 Name Claudio Leubler	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01918) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14) Function Laboratory Technician	Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-15 In house check: Oct-15

Certificate No: D1800V2-2d020_Mar15

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∷ BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHR191LW

(SQW100-4) SAR Report

Author Data Andrew Becker Dates of Test Mar 30 – May 14, 2015

RTS-6067-1505-05

Test Report No

FCC ID: L6ARHR190LW

2503A-RHR190LW

49(79)

Cali bration Laboratory of

Schmid & Partner Engineering AG Zeug Pausstrasse 43, 8004 Zurich, Switzerland





S Schweizerlscher Kalibrierdienst C Service suisse d'étalonnage Servizio svizzero di taratura S Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multi Faleral Agreement for the recognition of calibration certificates

Glossary:

TSL Con VF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured

Cali bration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: D1800V2-2d020_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

Fage **50(79)**

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Me@strement Conditions

A y system configuration, as far as not given on page 1.

DaSY Version	DASY5	V52.8.8
trapolation	Advanced Extrapolation	V02,0.0
Plantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zom Scan Resolution	dx, dy, dz = 5 mm	The second second
Frequency	1800 MHz ± 1 MHz	

Head 7SL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.1 ± 6 %	1.41 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	38.5 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.2 W/kg ± 16.5 % (k=2)



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

Fage **51(79)**

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

45.8 Ω - 8,4 jΩ
- 20.2 dB

Gen eral Antenna Parameters and Design

Electrical Delay (one direction)	
clectifical Delay (one direction)	1.04-
	1.215 ns

After flong term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

SPEAG
September 07, 2001

Certificate No: D1800V2-2d020_Mar15

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Document

Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

Page **52(79)**

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

Date: 12.03.2015

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d020

Communication System: UID 0 - CW; Frequency: 1800 MHz

Medium parameters used: f = 1800 MHz; $\sigma = 1.41 \text{ S/m}$; $\varepsilon_r = 39.1$; $\rho = 1000 \text{ kg/m}^3$

Phan tom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

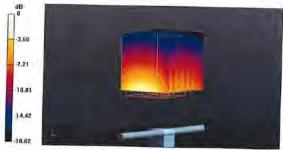
DAS Y52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.06, 5.06, 5.06); Calibrated; 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 94.84 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 17.9 W/kg SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.08 W/kg

Maximum value of SAR (measured) = 12.0 W/kg



0 dB = 12.0 W/kg = 10.79 dBW/kg



Appendix C for the BlackBerry® Smartphone Model RHR191LW

(SQW100-4) SAR Report

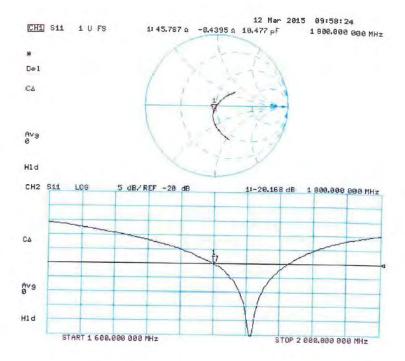
Author Data **Andrew Becker**

Dates of Test Mar 30 - May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

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Impedance Measurement Plot for Head TSL



Certificate No: D1800V2-2d020_Mar15

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1900 Dipole

Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

54(79)

Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

Calf bration Laboratory of Sch mid & Partner

Erngineering AG Zeugf **susstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Callbration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multifateral Agreement for the recognition of calibration certificates

Blackberry Waterloo

Certificate No: D1900V2-545_Mar15 CALIBRATION CERTIFICATE Coject D1900V2 - SN:545 Calibration procedure(s) **QA CAL-05.v9** Calibration procedure for dipole validation kits above 700 MHz Calibration date: March 12, 2015 This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (St) The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility; environment temperature (22 ± 3)°C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Primary Standards Cal Date (Certificate No.) Scheduled Calibration Power meter EPM-442A GB37480704 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A US37292783 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15 Reference 20 dB Attenuator SN: 5058 (20k) 03-Apr-14 (No. 217-01918) April 15 Type-N mismatch combination SN: 5047.2 / 06327 03-Apr-14 (No. 217-01921) Apr-15 Reference Probe ES3DV3 SN: 3205 30-Dec-14 (No. ES3-3205_Dec14) Dec-15 DAE4 SN- 601 18-Aug-14 (No. DAE4-601_Aug14) Aug-15 Secondary Standards Check Date (in house) Scheduled Check RF generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-13) In house check: Oct-16 Network Analyzer HP 8753E US37390585 S4206. 18-Oct-01 (in house check Oct-14) In house check: Oct-15 Name Function Calibrated by: Claudio Laubler Laboratory Technician Katia Pokovic Approved by: Technical Manager issued: March 13, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: D1900V2-545 Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW

(SQW100-4) SAR Report

55(79)

Author Data Andrew Becker Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

Cal bration Laboratory of Sch mid & Partner

Emgineering AG Zeug Frausstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst Service suisse d'étalonnage C Servizio svizzero di taratura S Swiss Calibration Service

Accreditation No.: SCS 0108

Appres cited by the Swiss Appreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multi lateral Agreement for the recognition of calibration certificates

Glossary:

TSL ConVF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,v,z not applicable or not measured

Cali bration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)*, February 2005

c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss; These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: D1900V2-545_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data **Andrew Becker**

Dates of Test

Mar 30 - May 14, 2015

Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

Me@⁸urement Conditions

CASY system configuration, as far as not given on page 1.

ASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy , $dz = 5 mm$	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.0 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	122	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.6 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.8 W/kg ± 16.5 % (k=2)

Certificate No: D1900V2-545_Mar15



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

57(79)

Author Data
Andrew Becker

Dates of Test

Mar 30 - May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

impedance, transformed to feed point	50.9 Ω + 0.9 IΩ
Return Loss	-37.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1,199 ns

After Long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when leaded according to the position as explained in the according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

SPEAG
November 15, 2001

Certificals No: D1900V2-545_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

Page **58(79)**

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

Date: 12.03.2015

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:545

Con munication System: UID 0 - CW; Frequency: 1900 MHz

Med 1 m parameters used: f = 1900 MHz; $\sigma = 1.38 \text{ S/m}$; $\varepsilon_r = 39$; $\rho = 1000 \text{ kg/m}^3$

Pharatom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DAS Y52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5, 5, 5); Calibrated: 30,12,2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 96.17 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 18.1 W/kg SAR(1 g) = 9.88 W/kg; SAR(10 g) = 5.18 W/kg Maximum value of SAR (measured) = 12.1 W/kg





Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

Page **59(79)**

Author Data
Andrew Becker

Dates of Test

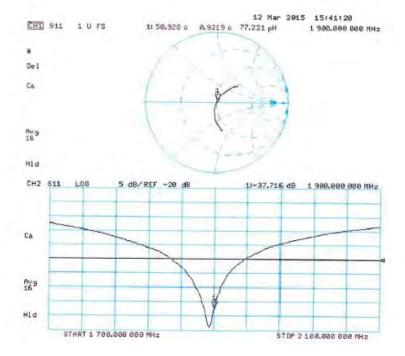
Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: **L6ARHR190LW**

2503A-RHR190LW

Impredance Measurement Plot for Head TSL



Certificate No: D1900V2-545_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

60(79)

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

2450 Dipole

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





Schwelzerischer Kalibrierdlenst Service suisse d'étalonnago Servizio svizzero di taratura Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client Blackberry Waterloo

Certificate No: D2450V2-791_Sep13

Object	D2450V2 - SN: 7	91	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ve 700 MHz
Calibration date;	September 10, 26	013	
The measurements and the unce	rtaintles with confidence p	onal standards, which realize the physical uni- robability are given on the following pages an y facility: environment temperature (22 \pm 3) 2 C	d are part of the certificate.
Calibration Equipment used (M&	TE critical for calibration)		
		Cal Data (Cartificate Na.)	Schodulad Calibration
Primary Standards	ID fi	Cal Date (Certificate No.)	Scheduled Calibration
Primary Standards Power meter EPM-442A	ID # GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Primary Standards Power meter CPM-442A Power sensor HP 8481A	ID ff GB37480704 US37292783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	THE STREET OF THE PROPERTY OF
Primary Standards Power meter EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783 SN: 5058 (20k)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736)	Oct-13
Primary Standards Power meter EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	ID ff GB37480704 US37292783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13 Oct-13 Apr-14
Primary Standards Power mater EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID ti GB87480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327	01-Nov-12 (No. 217-01840) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739)	Oct-13 Oct-13 Apr-14 Apr-14
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	ID # GB87480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Pype-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 96327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01799) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (in house)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID ti GB37480704 US37292783 SN; 5058 (20k) SN; 5047;3 / 96327 SN; 3205 SN; 601 ID # MY41092317	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (in house)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID# GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 \$4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01736) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. E33-3205_Dec12) 28-Dac-12 (No. E33-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Oct-01 (in house check Oct-12)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13 In house check; Oct-13
Primary Standards Power mater EPM-442A Power sensor HP 6481A Heferenice 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID# GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 1D0005 US37390585 \$4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01736) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. E33-3205_Dec12) 28-Dac-12 (No. E33-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Ox1-01 (in house check Oct-12)	Oct-13 Oct-13 Apr-14 Apr-14 Deu-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13 In house check; Oct-13
Primary Standards Power mater EPM-442A Power sensor HP 6481A Heferenice 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID# GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 \$4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01736) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. E33-3205_Dec12) 28-Dac-12 (No. E33-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Ox1-01 (in house check Oct-12)	Oct-13 Oct-13 Apr-14 Apr-14 Deu-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13 In house check; Oct-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 6481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E Catibrated by:	ID# GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 1D0005 US37390585 \$4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01736) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. E33-3205_Dec12) 28-Dac-12 (No. E33-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Ox1-01 (in house check Oct-12)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13 In house check; Oct-13

Certificate No: D2450V2-791_Sep13

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

61(79)

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Calibration Laboratory of Schmid & Partner

Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kallbrierdienst
C Service suisse d'étatonnage
Servizio svizzero di taratura
S Swiss Callbration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORM x,y,z
N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end
 of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed
 point exactly below the center marking of the flat phantom section, with the arms oriented
 parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole
 positioned under the liquid filled phantom. The impedance stated is transformed from the
 measurement at the SMA connector to the feed point. The Return Loss ensures low
 reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point.
 No uncertainty required.
- . SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: D2450V2-791_Sep13

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

62(79)

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22,0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	39.4 ± 6 %	1.83 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	1-44	-

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.6 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.0 W/kg ± 16.5 % (k=2)

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

63(79)

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	56 1 Ω + 3,4 Ω	
Return Loss	- 23.6 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	January 24, 2006	

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

Page **64(79)**

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

DASY5 Validation Report for Head TSL

Date: 10.09,2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 791

Communication System: UID 0 - CW; Frequency: 2450 M1Iz

Medium parameters used: f = 2450 MHz; $\sigma = 1.83$ S/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

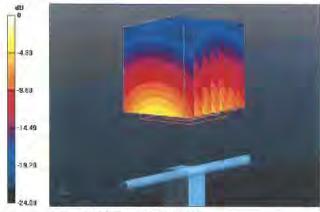
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12,2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics; DAE4 Sn601; Calibrated: 25,04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 99.824 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 26.7 W/kg SAR(1 g) = 13 W/kg; SAR(10 g) = 6.03 W/kg Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 16.9 W/kg = 12.28 dBW/kg

Certificate No: D2450V2-791 Sep13

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Appendix C for the BlackBerry® Smartphone Model RHR191LW

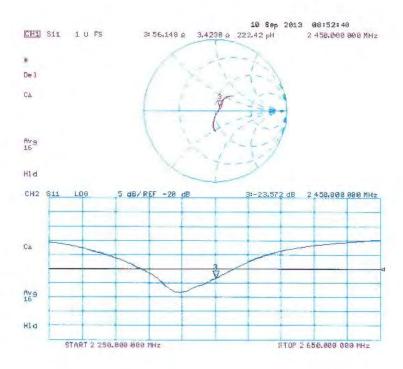
(SQW100-4) SAR Report

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Author Data **Andrew Becker** Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-791_Sep13

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Document

Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

2600 Dipole

Cali Pration Laboratory of Schrill & Partner En Sheering AG Zeugh auistrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kalibrierdienst C Service suisse d'étalonnage Servizio svizzero di taratura

Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 0108

Accreditation Service (SAS)

The Savies Accreditation Service is one of the signatories to the EA.

Multil^{S leg}l Agreement for the recognition of calibration certificates

Blackberry Waterloo

Certificate No: D2600V2-1033 Mar15

bject			
	D2600V2 - SN: 1	033	
alibration procedure(s)	QA CAL-05.v9 Calibration proce	edure for dipole validation kits abo	ove 700 MHz
allbration date:	March 13, 2015		
ne measurements and the uno	certainties with confidence purchased in the closed laborator	ional standards, which realize the physical un erobability are given on the following pages ar ry facility: environment temperature (22 \pm 3)"	nd are part of the certificate.
rimary Standards	10#	Cai Date (Certificate No.)	Scheduled Calibration
ower moter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
awer sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Gct-15
ower sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
leference 20 dB Altenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
ype-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
toterence Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205, Dec14)	Dec-15
AE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
econdary Standards	ID+	Check Date (in house)	Scheduled Check
F generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
letwork Analyzer HP 8753E	US37390585 S4206	15-Oct-01 (In house check Oct-14)	In house check: Oct-15
	Name	Function	Signature
alibrated by	Jeton Kastrati		Signature
annates by	ARION NOSTRIL	Laboratory Technician	10
pproved by:	Katja Pokovic	Technical Manager	All 19
			and the same of the same

Certificate No: D2600V2-1033_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

67(79)

Author Data Andrew Becker Dates of Test Mar 30 – May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

Cali Intion Laboratory of Schr Mil & Partner En 9heering AG Zeugh Strasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst. Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 0108

Apprecating by the Swiss Accreditation Service (SAS) The Savis Accreditation Service is one of the signatories to the EA Multil Agreement for the recognition of calibration certificates

Glos sary:

TSL ConvF

N/A

tissue simulating liquid sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- EEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- EC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms criented parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measu	rement
multiplied by the coverage factor k=2, which for a normal distribution corresponds to a co	verage
probability of approximately 95%.	

Certificate No: D2600V2-1033 Mar15



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

Page **68(79)**

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

Med surement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zeom Scan Resolution	dx, dy, dz = 5 mm	
Fiequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1,96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	37.2 ± 6 %	2.00 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-606	-

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	56.1 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Head TSL parameters	nomialized to 1W	25.0 W/kg ± 16.5 % (k=2)

Certificale No: D2600V2-1033_Mar15



Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

App endix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

inpedance, transformed to feed point	48.7 Q - 5.3 M
Return Loss	-25.2 dB

Gen eral Antenna Parameters and Design

Electrical Delay (one threction)	1.152 ns
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10218

After Long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dilpole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the leedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	March 03, 2009	

Certificate No: D2600V2-1033_Mar15

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Document

Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

70(79)

Author Data
Andrew Becker

Dates of Test

Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

FCC ID: L6ARHR190LW

2503A-RHR190LW

DAS 75 Validation Report for Head TSL

Date: 13.03.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT = Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1033

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: f = 2600 MHz; $\sigma = 2$ S/m; $\epsilon_r = 37.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

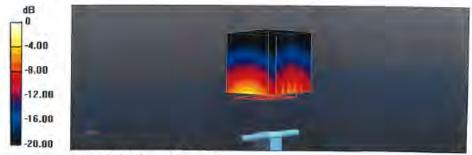
DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.49, 4.49, 4.49); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 101.6 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 30.3 W/kg SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.33 W/kg

Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 18.7 W/kg = 12.72 dBW/kg

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Appendix C for the BlackBerry® Smartphone Model RHR191LW (SQW100-4) SAR Report

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Andrew Becker

Dates of Test

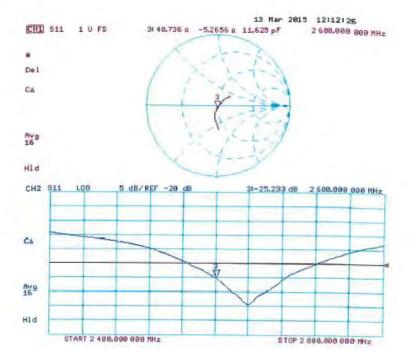
Mar 30 – May 14, 2015

Test Report No **RTS-6067-1505-05**

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Imp@dance Measurement Plot for Head TSL



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Author Data **Andrew Becker** Dates of Test Mar 30 - May 14, 2015 Test Report No RTS-6067-1505-05 FCC ID: L6ARHR190LW

2503A-RHR190LW

5000 Dipole

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kafibrierdienst Service suisse d'étalonnage C Servizio svizzero di taratura Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Client Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: D5GHzV2-1033_Nov13

	ERTIFICATE		
Object	D5GHzV2 - SN: 1	033	
Calibration procedure(s)	QA CAL-22.v2 Calibration proceed	dure for dipole validation kits bet	ween 3-6 GHz
Calibration date:	November 08, 20	13	
The measurements and the unca	ntainties with contidence potential in the closed laborator	onal standards, which realize the physical un cobability are given on the following pages an y facility: environment temperature (22 \pm 3)°C	d are part of the certificate.
Primary Standards	10 #	Cal Date (Certificate No.)	Scheduled Calibration
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.9 / 06327 SN: 3205 SN: 601	Cal Date (Certificate No.) 08-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Apr-14 Dec-13 Apr-14
DAE4	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.9 / 06327 SN: 3205 SN: 601	08-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01738) 04-Apr-13 (No. 217-01739) 28-Occ-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dac-13 Apr-14
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.9 / 06327 SN: 3205	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01826) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01736) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13) Check Date (in house)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house chack, Oct-15
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attanuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards HF generator R&S SMT-08 Network Analyzer HP 8753E	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5058 (20k) SN: 5047.9 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	08-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01738) 04-Apr-13 (No. 217-01739) 28-Oac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house chack Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dac-13 Apr-14 Scheduled Check In house check: Oct-15 In house check: Oct-14

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Dates of Test

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2503A-RHR190LW

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kallbrierdienst Service sulsse d'étalonnage

C Service suisse d'étalonnage Servizio svizzero di taratura

S Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL ConvF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
- c) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end
 of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed
 point exactly below the center marking of the flat phantom section, with the arms oriented
 parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole
 positioned under the liquid filled phantom. The impedance stated is transformed from the
 measurement at the SMA connector to the feed point. The Return Loss ensures low
 reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point.
 No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

DASY system configuration, as far as not given on page 1

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.0 ± 6 %	4.46 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-	-

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.4 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.6 W/kg ± 19.5 % (k=2)

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mhq/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	34.6 ± 6 %	4.75 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-	

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.51 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	84.4 W / kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.9 W/kg ± 19.5 % (k=2)

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Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22,0 °C	35,3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	34.2 ± 6 %	5.06 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		-

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.4 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.6 W/kg ± 19.5 % (k=2)

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Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.1 Ω - 9.6 [Ω
Return Loss	- 20.3 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	50.3 Ω - 4.1 μΩ
Return Loss	- 27.7 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	57.8 Ω - 4.0 jΩ
Return Loss	- 21.8 dB

General Antenna Parameters and Design

1.213 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 09, 2004

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DASY5 Validation Report for Head TSL

Date: 08.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1033

Communication System: UID 0 - CW ; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz

Medium parameters used: f = 5200 MHz; $\sigma = 4.46$ S/m; $\epsilon_r = 35$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5500 MHz; $\sigma = 4.75$ S/m; $\epsilon_r = 34.6$; $\rho = 1000$ kg/m³ Medium parameters used: f = 5800 MHz; $\sigma = 5.06$ S/m; $\epsilon_r = 34.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard; DASY5 (TEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phamom: Flat Phantom 5.0 (front); Type: QD000P50AA, Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.635 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 29.5 W/kg

SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.28 W/kg

Maximum value of SAR (measured) = 18.4 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.397 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 33.8 W/kg

SAR(1 g) = 8.51 W/kg; SAR(10 g) = 2.41 W/kg

Maximum value of SAR (measured) = 20.3 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 61.128 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 33.0 W/kg

SAR(1 g) = 8.01 W/kg; SAR(10 g) = 2.28 W/kg

Maximum value of SAR (measured) = 19.2 W/kg

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Andrew Becker

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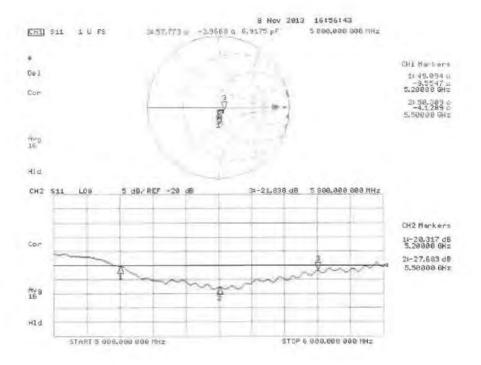
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Impedance Measurement Plot for Head TSL



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